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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/650,851	08/29/2000	Mandeep Singh Chadha	CHADHA 1-1-1-1	9885

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EXAMINER	
LIU, SHUWANG	

ART UNIT	PAPER NUMBER
2634	8

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	09/650,851	CHADHA ET AL.	
	Examiner	Art Unit	
	Shuwang Liu	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

1. Applicant's arguments filed 1/30/04 have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

Applicant's argument – "Turner does not teach or suggest a portion of a precoder formed from concatenating a noise prediction equalizer and decision feedback equalizer during showtime of a bit pump as recited in Claims 1 and 8. Instead, Turner teaches a precoder with a dedicated multitap filter (29 of Figure 1)." Furthermore, the Applicants argue that "the cited combination of Bjarnason and Turner does not present a prima facie case of obviousness of Clams 1-14."

Examiner's response – In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rilckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993) and in re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). A prima facie case of obviousness is established by presenting evidence that the reference teachings would appear to have suggested the claimed subject matter to one of ordinary skill in the art. See In re Bell, 991 F.2d 781, 783, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993); In re Fritch, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992); Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories Inc, 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985). It also cannot show non-obviousness by attacking

references individually where, as here the rejections are based on combination of reference. *In re Keller*, 208 USPQ 871 (CCPA 181).

The Examiner points to a filter circuit of Bjarnason et al., which comprises a noise prediction equalizer (318 or 418) configured to generate a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with a receive signal propagating along said receive path (column 5, lines 13-51); and a decision feedback equalizer (306 or 406) configured to generate a decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal, said noise prediction equalizer adapted to be concatenated with said decision feedback equalizer during showtime of said bit pump (column 5, lines 13-62). Bjarnason et al. also teach the benefit to use the filter circuit is that the filter provides an improved technique for cancellation of period noise in a digital data communication system (column 2, lines 22-24).

The Examiner also points out that Turner et al. discloses a precoder (Tomlinson precoder) used in a transmission path (figure 1). A filter (FIR/IIR) (29) is at least a portion of the precoder (25). The FIR/IIR filter (29) comprises a decision feedback equalizer (column 8, lines 18-25). Turner et al. also teaches that Tomlinson precoder in the transmit section provides a high data rate and bandwidth efficient in the communication system (column 8, lines 7-20, Turner et al.).

The Examiner further relies on the benefits of the filter circuit of Bjarnason et al. applied to the precoder of Turner et al. to reduce the intersymbol interference and noise

associated with the received signal and concludes that one of ordinary skill in the art would have been motivated to combine the references.

When an obviousness determination relies on the combination of two or more references, there must be some suggestion or motivation to combine the references. See In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed. Cir. 1998). The suggestion to combine may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved. See id. at 1357, 47 USPQ2d at 1458. Moreover, as long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor. See In re Dillon, 919 F.2d 688, 693, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990)(en banc), cert. denied, 500 U.S. 904 (1991) and In re Beattie, 974 F.2d 1309, 1312, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992). Thus, as stated by the Examiner, the advantages described by Bjarnason et al. would have motivated one of ordinary skill in the art to employ the filter circuit in the precoder of Turner et al.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjarnason et al. (US 6,434,233) in view of Turner et al. (US 5,809,033).

As shown in figures 3 and 4, Turner et al. discloses a filter circuit and a method of configuring a filter circuit for use with a bit pump (figure 2) having a transmit (228) and receive path (210), comprising:

(1) regarding claims 1, 6-8, 13 and 14:

a noise prediction equalizer (318 or 418) configured to generate a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with a receive signal propagating along said receive path (column 5, lines 13-51); and

a decision feedback equalizer (306 or 406) configured to generate a decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal, said noise prediction equalizer adapted to be concatenated with said decision feedback equalizer during showtime of said bit pump (column 5, lines 13-62).

Bjarnason et al. discloses all of the subject matter as described above except for specifically teaching to form at least a portion of a precoder associated with said transmit path as claimed in claims 1 and 8.

Turner et al., in the same field of endeavor, teaches a bit pump (figure 1) which has a precoder (25 in figure 1) associated with the transmit path and an equalizer (53). Furthermore, the precoder is a Tomlinson-Harashima precoder (25) as recited in claims 6 and 13 and comprises a plurality of taps (29) as recited in claims 7 and 14.

It would be desirable to remedy incompatibility problem by installing the Tomlinson precoder in the transmit section in order to have a high data rate and bandwidth efficient in the communication system (column 8, lines 7-20, Turner et al.). It would also desirable to use the filter of Bjarnason et al. in the precoder of Turner et al in order to provides an improved technique for cancellation of period noise in a digital data communication system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the filter of Bjarnason et al. in the precoder located in the transmit path as taught by Turner et al. in order to remedy incompatibility problem. In doing so, the system can reduce the intersymbol interference and noise associated with the received signal.

(2) regarding claims 2 and 9:

wherein said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a feed forward equalizer (304 or 404) during said activation of said bit pump.

(3) regarding claims 3 and 10:

wherein said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a slicer (310 or 410) during said activation of said bit pump.

(4) regarding claims 4 and 11:

wherein each of said noise prediction equalizer and said decision feedback equalizer inherently comprise delay lines associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

(5) regarding claims 5 and 12:

wherein said noise prediction equalizer and said decision feedback equalizer inherently comprise noise prediction equalizer and decision feedback equalizer coefficient arrays respectively associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

4. Claims 15-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. (US 5,809,033) in view of Bjarnason et al. (US 6,434,233) and Norsworthy et al. (US 5,512,898).

As shown in figure 1, Turner et al. discloses:

(1) regarding claims 15, 20-22, 27 and 28:

a transceiver, comprising:

a framer (15) that formats signals within said transceiver;

a bit pump (17-65) coupled to said framer and having a transmit (TX) and receive path (RX), including:

a modulator (23), coupled to said transmit path, that reduces a noise associated with a transmit signal propagating along said transmit path (column 7, lines 42-50);

an analog-to-digital converter (43), coupled to said receive path, that converts a receive signal received at said bit pump into a digital format;

a filter circuit (25 and 53), wherein a precoder associated with said transmit path is formed; and

an echo canceling system (51), coupled between said transmit and receive path, that attenuates an echo in said receive signal.

Furthermore, the precoder is a Tomlinson-Harashima precoder (25) as recited in claims 20 and 27 and comprises a plurality of taps (29) as recited in claims 21 and 28.

Turner et al. discloses all of the subject matter as described above except for specifically teaching (A) a decimator, coupled to said analog-to-digital converter, that downsamples said receive signal propagating along said receive path; and (B) a filter circuit, including: a noise prediction equalizer that generates a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with said receive signal, and a decision feedback equalizer that generates a decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal.

With respect to item (A), Norsworthy, in the same field of endeavor, teaches a decimator (see inside 306 in figure 2) coupled to the analog-to-digital converter (220'), that downsamples the receive signal propagating along the receive path (column 10, lines 17-46).

It is well known that decimator is used to reduce the digital signal sampling rate of input digital signal in order to enable further processing of the digital signal. It would be also desirable to remove the noise beyond the Nyquist frequency without alias by using the decimator to lower the sampling rate to the Nyquist rate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the decimator as taught by Norsworthy et al. in the receive path of Turner et al.

in order to lower the sampling rate to the Nyquist rate. In doing so, the noise beyond the Nyquist frequency is removed.

With respect to item (B), Bjarnason et al., in the same field of endeavor, teaches a filter circuit comprising:

a noise prediction equalizer (318 or 418) configured to generate a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with a receive signal propagating along said receive path (column 5, lines 13-51); and

a decision feedback equalizer (306 or 406) configured to generate a decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal, said noise prediction equalizer adapted to be concatenated with said decision feedback equalizer during showtime of said bit pump (column 5, lines 13-62).

It would be desirable to adequately remove periodic interference from the equalized signal (column 2, lines 1-19) in order to increase the signal to noise ration and data rate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the filter circuit as taught by Bjarnason et al. to replace the adaptive equalizer in the receive path of Turner et al. in order to adequately remove periodic interference from the equalized signal. In doing so, the signal to noise ration and data rate will be increased.

Furthermore, Bjarnason et al. teaches:

(2) regarding claims 16 and 23:

said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a feed forward equalizer (304 or 404) during said activation of said bit pump.

(3) regarding claims 17 and 24:

said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a slicer (310 or 410) during said activation of said bit pump.

(4) regarding claims 18 and 25:

each of said noise prediction equalizer and said decision feedback equalizer inherently comprise delay lines associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

(5) regarding claims 19 and 26:

said noise prediction equalizer and said decision feedback equalizer inherently comprise noise prediction equalizer and decision feedback equalizer coefficient arrays respectively associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shuwang Liu whose telephone number is (703) 308-9556.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin, can be reached at (703) 305-4714.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Shuwang Liu
Primary Examiner
Art Unit 2634

March 23, 2004